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Clinico-Epidemiological Profile, Laboratory Characteristics, and Outcomes of Hepatitis A Infection in Children at a Tertiary Care Center in Nepal

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Abstract

Background:

Hepatitis A virus (HAV) infection remains an important cause of acute viral hepatitis among children in low- and middle-income countries. Improvements in sanitation and socioeconomic conditions have resulted in a shift in HAV epidemiology toward older age groups, leading to an increasing proportion of symptomatic disease. However, contemporary data on the clinical spectrum and complications of pediatric hepatitis A in Nepal remain limited. This study aimed to evaluate the clinico-epidemiological profile, laboratory characteristics, complications, and outcomes of hepatitis A infection among children in a tertiary care center in Nepal and to identify factors associated with complications.

Methods:

A prospective observational study was conducted among children aged ≤ 14 years with serologically confirmed hepatitis A infection attending the inpatient and outpatient pediatric services at Kanti Children's Hospital between April 2025 and March 2026. Demographic, epidemiological, clinical, laboratory, ultrasonographic, complication, and outcome data were collected using a structured proforma. Factors associated with complications were analyzed using Fisher's exact test, with p value < 0.05 considered statistically significant.

Results:

A total of 137 children were enrolled, with a mean age of 7.01 ± 3.42 years; 66.4% were male. The majority of cases occurred in children aged 5–10 years (45.3%). Most children belonged to lower-middle and lower socioeconomic strata, and 90.5% of households reported no water treatment practices. None of the enrolled children had received hepatitis A vaccination. Cases peaked during the monsoon season (40.1%). Jaundice (87.6%), abdominal pain (81.8%), and fever (78.8%) were the most common presenting symptoms, while hepatomegaly was observed in 69.3% of children. Gallbladder wall thickening (81.8%) was the most frequent ultrasonographic finding. Acute liver failure occurred in 13.1% of patients, hepatic encephalopathy in 6.6%, and mortality was 1.5%. Total bilirubin > 10 mg/dL (p = 0.021) and prolonged activated partial thromboplastin time (aPTT) > 45 seconds (p < 0.001) were significantly associated with complications.

Conclusions:

Hepatitis A infection continues to impose a substantial clinical and public health burden among children in Nepal, particularly among unvaccinated children from lower socioeconomic backgrounds with inadequate water sanitation practices. Although outcomes were generally favorable, severe

complications including acute liver failure were observed. Elevated bilirubin and prolonged aPTT may serve as indicators of complications in children with hepatitis A infection. Strengthening preventive strategies including safe water access, sanitation measures, and consideration of hepatitis A vaccination may help reduce disease burden.

Background

Hepatitis A virus (HAV) infection remains a common cause of acute viral hepatitis in children, particularly in low- and middle-income countries. Globally, hepatitis A is estimated to cause approximately 1.5 million clinically apparent cases annually, although the true burden is substantially higher because many pediatric infections are asymptomatic [1]. Transmission occurs primarily through the fecal–oral route and is closely linked to inadequate sanitation, unsafe water supplies and poor socioeconomic conditions [2]. As a result, hepatitis A continues to impose a substantial healthcare burden in low- and middle-income countries through increased hospitalizations and morbidity [3].

Clinical manifestations of Hepatitis A in children are usually acute and self-limiting, commonly presenting with nonspecific symptoms such as fever, malaise, anorexia, nausea, vomiting, abdominal pain, and diarrhoea. The clinical presentation varies according to age, with only approximately 30% of children younger than six years developing symptomatic hepatitis, many of whom have mild illness or remain asymptomatic. In contrast, nearly 70% of older children and adults develop jaundice, and symptomatic hepatitis is more common in this age group, often accompanied by hepatomegaly [4, 5].

Although hepatitis A is generally self-limiting, a subset of children may develop complications such as acute liver failure, coagulopathy, and hepatic encephalopathy, which can be life-threatening [6]. Early identification of children at risk of severe disease is therefore important for timely management.

Vaccination against hepatitis A has been shown to significantly reduce disease incidence and outbreaks in countries where it has been widely implemented [7, 8]. However, in Nepal, hepatitis A vaccination is not routinely included in the national immunization program, potentially leaving many children susceptible to infection [9]. Improving socioeconomic conditions and sanitation in several developing countries have resulted in an epidemiological shift toward older age groups, in whom hepatitis A tends to present more symptomatically and with greater severity [10].

Despite the ongoing burden of hepatitis A in Nepal, recent pediatric data describing the changing clinical spectrum, laboratory abnormalities, complications, and predictors of severe disease remain limited. Therefore, this study aimed to assess the clinico-epidemiological profile, laboratory characteristics, complications, and outcomes of pediatric hepatitis A infection in a tertiary care center in Nepal, and to identify factors associated with severe disease.

Methods

Study Design and Setting

This was a prospective hospital-based observational study conducted among children presenting to inpatient and outpatient pediatric services of Kanti Children's Hospital which is the largest government tertiary care center for children in Nepal and serves as a major tertiary referral center for pediatric patients across Nepal. The study was carried out over a period of one year from April 2025 to March 2026 following approval from Institutional Review Committee of Kanti Children's Hospital (IRC No. 1219; Date 3rd March 2025). Written informed consent was obtained from parents or legal guardians prior to enrolment.

Study Participants

Children aged ≤ 14 years presenting to the hospital with suspected acute viral hepatitis A during the study period were screened for eligibility. Patients were included if they had serologically confirmed hepatitis A infection, defined by positive anti-hepatitis A virus (HAV) IgM antibodies, and if informed consent was obtained from their parents or legal guardians.

Patients were excluded if they had other viral hepatitis infections (hepatitis B, C, D, or E), underlying chronic liver disease, immunocompromised conditions (including HIV infection, malignancy, or immunosuppressive therapy), or a history of hepatotoxic drug use. Patients whose parents denied consent were also excluded. Cases with incomplete essential clinical or laboratory data were excluded from relevant analyses.

Sample Size and Sampling

A consecutive sampling technique was used, in which all eligible children presenting to the study site during the study period were enrolled until the end of the study period. No formal sample size calculation was performed, as the study aimed to include all available cases meeting the inclusion criteria. This approach was used to minimize selection bias.

Data Collection

Data were collected prospectively using a predesigned structured proforma. Baseline demographic information (age, sex, socioeconomic status) and clinical details (symptoms such as fever, jaundice, abdominal pain, vomiting, nausea, anorexia, pruritus) were recorded. Epidemiological factors including water source, household water treatment, vaccination status for hepatitis A and contact with individuals having jaundice or suspected viral hepatitis were recorded. Socioeconomic status was determined using the modified Kuppuswamy socioeconomic status scale adapted for the Nepalese context in 2019 [11], incorporating parental education, occupation, and monthly family income.

Clinical examination findings included vital signs, presence of icterus, hepatomegaly, splenomegaly, and other relevant physical findings. Laboratory data were obtained from hospital records as part of routine

clinical care and included complete blood count, liver function tests - serum bilirubin, alanine aminotransferase (ALT), aspartate aminotransferase (AST), alkaline phosphatase, total protein, and albumin), and coagulation profile (Prothrombin Time (PT), aPTT and international normalized ratio (INR). Imaging findings from abdominal ultrasonography were recorded.

Outcomes

The primary outcome was to describe the clinico-epidemiological characteristics and laboratory profile of children with hepatitis A. Secondary outcomes included identification of complications and clinical outcomes during hospital stay. Complications assessed were acute liver failure, coagulopathy, hepatic encephalopathy, and persistent cholestatic hepatitis. Clinical outcomes were categorized as improved (discharged with clinical recovery) or death (all-cause in-hospital mortality). Additionally, factors associated with complications were evaluated using selected clinical and laboratory parameters.

Acute liver failure in children was defined as acute liver injury in the absence of pre-existing chronic liver disease, with coagulopathy not corrected by vitamin K administration, characterized by PT ≥ 15 seconds or INR ≥ 1.5 in the presence of hepatic encephalopathy; or PT ≥ 20 seconds or INR ≥ 2.0 irrespective of encephalopathy [12, 13].

Hepatic encephalopathy (HE) is a neuropsychiatric syndrome associated with hepatic dysfunction defined clinically by altered level of consciousness in the absence of other identifiable causes [14].

Persistent cholestatic hepatitis was defined as persistence of jaundice and elevated bilirubin levels beyond 12 weeks from onset of illness[15].

Icteric hepatitis was defined as hepatitis with clinically evident jaundice, while non-icteric hepatitis referred to cases without visible jaundice.

Laboratory parameters were categorized using clinically relevant cut-off values based on standard pediatric reference ranges and prior literature.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using Statistical Package for the Social Sciences (SPSS) version 26.0. Continuous variables were summarized as mean ± standard deviation, while categorical variables were expressed as frequencies and percentages. Comparisons between groups were performed using Fisher's exact test. A p-value < 0.05 was considered statistically significant. INR was excluded from analysis of factors associated with complications to avoid overlap bias, as it forms part of the definition of coagulopathy within the composite outcome.

Results

A total of 137 children diagnosed with hepatitis A were enrolled in the study over a period of one year from April 2025 to March 2026.

Table 1
Demographic, Socioeconomic and Epidemiological Profile (n = 137)

Variable	Frequency(n)	Percentage (%)
Age Group		
< 5 years	37	27.0
5–10 years	62	45.3
> 10 years	38	27.7
Sex Distribution		
Male	91	66.4
Female	46	33.6
Modified Kuppuswamy Classification		
Class I	2	1.5
Class II	32	23.4
Class III	65	47.4
Class IV	37	27.0
Class V	1	0.7
Vaccination Status for Hepatitis A		
Vaccinated	0	0.0
Not Vaccinated	137	100.0
Family history of similar illness		
Positive	9	6.6
Negative	128	93.4
Water Source		
Jar Water	47	34.3
Piped Water (Municipal supply)	30	21.9
Hand pump	27	19.7
Spring Water	17	12.4
Tube Well	16	11.7
Water Treatment Practices at Home		
Boiled	10	7.3

Variable	Frequency(n)	Percentage (%)
Age Group		
Filtered	3	2.2
No treatment	124	90.5

The majority of the children belonged to age group of 5–10 years (45.3%) followed by children aged more than 10 years (27.7%) and those < 5years (27%). The mean age of the children was 7.01 ± 3.42 years. There was a male predominance, with males accounting for 66.4% of cases with male to female ratio of 1.98. Socioeconomic assessment using the Modified Kuppuswamy classification revealed that a large proportion of children belonged to Class III (47.4%), followed by Class IV (27.0%) accounting for nearly three -fourth of the study population. None of the children received Hepatitis A vaccination. A positive family history of similar illness was reported in 6.6% of cases. The most common source of water was jar water (34.3%), followed by municipal piped water supply (21.9%), hand pumps (19.7%) and spring water (12.4%). The vast majority of households (90.5%) did not practice any form of water treatment. (Table 1)

Hepatitis A cases were recorded throughout the year, with a gradual rise beginning in May and a clear peak in July (n = 27). The number of cases declined thereafter, reaching the lowest levels in October (n = 3), followed by a mild increase during the winter months. (Fig. 1)

The highest number of cases occurred during the summer/monsoon season (June–August), accounting for 40.1% of total cases followed by winter (25.6%) and spring (20.4%). The lowest proportion was observed during autumn (13.9%). (Fig. 2)

Table 2
Clinical Presentation of study population (n = 137)

Clinical Features	Frequency (n)	Percentage (%)
Symptoms		
Fever	108	78.8
Yellowish Discolouration of Skin and Sclera	120	87.6
Abdominal Pain	112	81.8
Nausea/Vomiting	101	73.7
Anorexia	93	67.9
Pruritus	11	8.0
Signs		
Icterus	122	89.1
Hepatomegaly	95	69.3
Splenomegaly	3	2.2
Altered Sensorium	9	6.6

The most common presenting symptom was yellowish discoloration of the skin and sclera (87.6%), followed by abdominal pain (81.8%) and fever (78.8%). Nausea or vomiting (73.7%) and anorexia (67.9%) were also frequently reported, while pruritus was relatively uncommon (8.0%).

On clinical examination, icterus was observed in 89.1% of children. Hepatomegaly was present in 69.3% of cases, whereas splenomegaly was relatively uncommon (2.2%). Altered sensorium was present in 6.6% of patients. (Table 2)

Table 3
Icteric vs Non-Icteric Hepatitis (n = 137)

Type of presentation	Frequency(n)	Percentage (%)
Icteric Hepatitis	122	89.1
Non-icteric Hepatitis	15	10.9
Age Distribution in Icteric and Non-Icteric Hepatitis		
Age Group	**Icteric Hepatitis(n)**	**Non-icteric Hepatitis(n)**
< 5 years	27	10
5–10 years	60	2
> 10 years	35	3

Icteric hepatitis was present in the majority of children accounting for 89.1% while non-icteric hepatitis was present in 10.9%. Non-icteric hepatitis cases were more common in children under 5 years of age.

Table 4
Laboratory Parameters of study population (n = 137)

Parameters	Range	Frequency(n)	Percentage
Total Serum Bilirubin (mg/dl)	**Up to 10**	118	86.1
	10–20	15	11.0
	> 20	4	2.9
Direct Serum Bilirubin (mg/dl)	**Up to 2**	36	26.3
	2–5	56	40.9
	5–10	35	25.5
	> 10	10	7.3
Serum AST(U/L)	**Up to 500**	58	42.3
	500–1500	34	24.8
	> 1500	45	32.8
Serum ALT(U/L)	**Up to 500**	40	29.2
	500–1500	50	36.5
	> 1500	47	34.3
INR	**< 1.2**	80	58.4
	1.2–1.5	28	20.4
	> 1.5	29	21.2
Prothrombin Time (PT) (sec)	**Normal (< 15 sec)**	89	65.0
	Mildly prolonged (15–20 sec)	27	19.7
	Significantly prolonged (> 20 sec)	21	15.3
Activated Partial Thromboplastin Time (APTT) (sec)	**Normal (< 35 sec)**	59	43.1
	Mildly prolonged (35–45 sec)	47	34.3
	Significantly prolonged (> 45 sec)	31	22.6

Majority of the children (86.1%) had total serum bilirubin levels ≤ 10 mg/dL, while 2.9% had levels > 20 mg/dL. Most Children (40.9%) had Direct bilirubin levels between 2–5 mg/dL. Serum ALT levels was > 1500 U/L in 34.3% of cases, while 32.8% had AST levels > 1500 U/L. Coagulation abnormalities were also seen with INR > 1.5 in 21.2%, Prothrombin time > 20 seconds in 15.3% and activated partial thromboplastin time (aPTT) > 45 seconds in 22.6% of the patients. (Table 4)

Table 5
Mean and Standard Deviation of Laboratory Parameters

Parameter	Mean ± SD
Total Bilirubin (mg/dL)	7.03 ± 5.99
Direct Bilirubin (mg/dL)	4.63 ± 4.50
ALT (U/L)	1289.71 ± 1074.14
AST (U/L)	1142.94 ± 1133.55
INR	1.36 ± 0.64
PT (sec)	16.16 ± 7.42
APTT (sec)	41.56 ± 25.46

The mean total bilirubin was 7.03 ± 5.99 mg/dL, while mean ALT and AST levels were 1289.71 ± 1074.14 U/L and 1142.94 ± 1133.55 U/L, respectively. (Table 5)

Table 6
Ultrasonography Findings Only (n = 137)*

Ultrasonography Finding	Frequency (n)	Percentage (%)
Hepatomegaly	86	62.7
Gall Bladder Thickening / Wall Edema	112	81.8
Splenomegaly	4	2.9
Ascites	65	47.4
Pleural Effusion	11	8.0
Periportal Lymphadenopathy	14	10.2
Acalculous Cholecystitis	16	11.7

*Multiple findings may be present in the same patient

Gall bladder wall thickening/wall edema was the most common ultrasound finding present in 81.8% of cases followed by hepatomegaly in 62.7% and ascites in 47.4% of children. Other findings included

periportal lymphadenopathy (10.2%), acalculous cholecystitis (11.7%), pleural effusion (8.0%), and splenomegaly (2.9%). Multiple findings were also present in the same patient.

Table 7
Complications at the time of presentation**

Acute liver failure	**18**	**13.1**
Coagulopathy	18	13.1
Hepatic encephalopathy	9	6.6
Prolonged Cholestatic Hepatitis	2	1.5

**Multiple complications may be present in the same patient

Complications at presentation were observed in 18 (13.1%) children. Acute liver failure and coagulopathy were present in all complicated cases. Hepatic encephalopathy occurred in 9 (6.6%) children, while prolonged cholestatic hepatitis was uncommon, occurring in 2 (1.5%) cases.

Table 8
Outcome During Hospital Stay

Outcome	Frequency (n)	Percentage (%)
Improved	135	98.5
Mortality	2	1.5

The majority of children (98.5%) improved while there were two deaths with mortality rate of 1.5%.

Table 9
Clinical and Laboratory Characteristics According to Outcome (Descriptive analysis)***

Variable	Improved (n = 135)	Mortality (n = 2)
Age group (< 5 / ≥5 years)	**37 / 98**	**0/ 2**
Sex (Male/Female)	**89 / 46**	**2 / 0**
Total Bilirubin > 10 mg/dL	**18**	**1**
ALT > 1500 U/L	**45**	**2**
AST > 1500 U/L	**43**	**2**
INR > 1.5	**27**	**2**
PT > 20 sec	**19**	**2**
aPTT > 45 sec	**29**	**2**

****Due to low mortality events (n = 2), statistical testing was not performed.*

Due to the small number of mortality events, statistical comparison between survivors and non-survivors was not performed. However, both non-survivors had markedly deranged liver enzymes and severe coagulation abnormalities.

Table 10
Factors associated with composite complications**** Composite complication defined as presence of ≥ 1 of acute liver failure, coagulopathy, persistent cholestatic hepatitis or hepatic encephalopathy.

Variable	Complication Present (n = 18)	Complication Absent (n = 119)	p-value
Age < 5 years	8 (44.4%)	29 (24.4%)	0.090
Age ≥ 5 years	10 (55.6%)	90 (75.6%)	
Male	12 (66.7%)	79 (66.4%)	1.000
Female	6 (33.3%)	40 (33.6%)	
Total bilirubin > 10 mg/dL	6 (33.3%)	13 (10.9%)	0.021
ALT > 1500 U/L	8 (44.4%)	39 (32.8%)	0.425
AST > 1500 U/L	9 (50.0%)	36 (30.3%)	0.111
aPTT > 45 sec	14 (77.8%)	17 (14.3%)	< 0.001

*****INR was excluded from the analysis due to its inclusion in the definition of coagulopathy within the composite outcome to avoid overlap bias.*

On analysis of factors associated with composite complications, total bilirubin > 10 mg/dL was significantly associated with complications ($p = 0.021$). A prolonged aPTT (> 45 seconds) showed a strong association with complications ($p < 0.001$). No significant association was observed with age, sex, ALT levels, or AST levels. Due to the relatively small number of complication events, multivariable regression analysis was not performed.

Discussion

This prospective hospital-based study from a tertiary care center in Nepal provides insight into the clinico-epidemiological profile, complications, and outcomes of hepatitis A infection among children. The majority of cases occurred in the 5–10 years age group, with mean age of 7.01 ± 3.42 years. This pattern reflects the ongoing epidemiological transition in developing countries, where improvement in sanitation delays early childhood exposure, resulting in increased susceptibility among older children. Similar trends have been reported from other South Asian settings, suggesting a shift from high to intermediate endemicity [16]. The observed male predominance is consistent with regional studies, although it is more likely related to healthcare-seeking behaviour and sociocultural factors rather than true biological differences [17] .

A large proportion of children in our study consumed untreated water, and most households did not practice any form of water purification. In addition, nearly three-fourths of the study population belonged to lower-middle and lower socioeconomic strata (Modified Kuppuswamy Classes III and IV). These findings point toward the continued role of socioeconomic disadvantage in hepatitis A transmission, particularly through unsafe water and poor sanitation. Such conditions facilitate fecal–oral transmission and remain key drivers of disease burden in resource-limited settings [18]. These findings emphasize the need for targeted public health interventions, including improvement in water quality, sanitation, and hygiene practices in vulnerable populations.

In our study, a proportion of children had a history of similar illness among family members. Similar observations have been reported in studies from endemic regions, where clustering of cases within families is common, particularly in settings with overcrowding and inadequate sanitation [8].

In our study, a noticeable variation in case distribution was observed across different months, suggesting a seasonal trend in hepatitis A infection where an increase in hepatitis A cases was commonly seen during the monsoon and post-monsoon periods. This pattern is well recognized in South Asian regions and likely related to contamination of water sources during periods of flooding and disruption of sanitation systems during rainy seasons [19]. Strengthening water safety and sanitation measures during these high-risk periods is essential to prevent outbreaks.

In this study none of the participants were immunized with hepatitis A vaccination. Evidence from countries implementing universal immunization programs has demonstrated a marked decline in disease incidence and outbreak frequency [20–22]. Integrating hepatitis A vaccination into national

immunization strategies, along with improvements in sanitation and access to safe drinking water, could substantially reduce disease burden.

The clinical presentation observed in this study was consistent with the typical presentation of hepatitis A in children. Jaundice was the most common presenting feature, followed by abdominal pain and fever which is consistent with finding from other studies [23]. Hepatomegaly was also frequently observed, reflecting hepatic inflammation. Non-icteric hepatitis was less common and was more frequently seen in younger children, which has been described in previous literature and similar studies [24, 25].

Laboratory findings demonstrated markedly elevated transaminase levels in most patients, indicating significant hepatocellular injury. Coagulation abnormalities were observed in a subset of cases and are clinically relevant as potential indicators of severe disease which are similar to recent studies from India and other regions [26, 27]. Notably, elevated total bilirubin (> 10 mg/dL) and aPTT > 45 sec were significantly associated with complications in our cohort, suggesting their potential utility as potential indicator of complication which are similar to the finding of recent studies from low- and middle-income countries [28].

Ultrasonography in our study revealed gallbladder wall thickening as the most frequent finding, followed by hepatomegaly and ascites, reflecting hepatic inflammation and periportal edema characteristic of acute viral hepatitis. These findings align with a similar study which emphasized the role of ultrasonography finding as a valuable supportive evidence and excludes other differential diagnoses [29].

Although hepatitis A is typically self-limiting, complications such as acute liver failure, coagulopathy, and hepatic encephalopathy were observed in a minority of cases. The proportion of acute liver failure observed in our study was higher than that reported in several community-based and non-referral-center studies. This may reflect the tertiary referral nature of our institution, where children with severe hepatitis and hepatic dysfunction are preferentially referred. Despite this, overall outcomes were favorable, with most children recovering completely and a low mortality rate of 1.5%. These findings are consistent with recent studies which report good outcomes in the majority of pediatric cases [30].

Overall, our findings suggest that hepatitis A remains an important cause of pediatric morbidity in Nepal despite improving socioeconomic conditions, with a subset of children developing potentially severe complications. This study has certain limitations. Being a single-center hospital-based study, the findings may not be generalizable to the wider population. The relatively small number of complicated cases limited the ability to perform detailed statistical analysis for mortality-related outcomes. Additionally, long-term follow-up was not conducted to assess delayed complications. Despite these limitations, this study provides valuable prospective data on hepatitis A infection in children. The findings highlight the importance of early identification of risk factors for severe disease and reinforce the need for preventive strategies, including vaccination and improved sanitation.

Conclusion

Hepatitis A remains an important cause of pediatric morbidity in Nepal, particularly among socioeconomically vulnerable children with inadequate access to safe water and sanitation. Although most children had favorable outcomes, serious complications including acute liver failure and hepatic encephalopathy were observed in a subset of cases. Elevated bilirubin levels and aPTT > 45 sec were associated with complication. The absence of hepatitis A vaccination among all participants highlights an important preventive gap. Strengthening sanitation, access to safe drinking water, and consideration of hepatitis A vaccination may help reduce disease burden and prevent severe outcomes in children.

Abbreviations

HAV
Hepatitis A virus
aPTT
activated Partial Thromboplastin Time
IRC
Institutional Review Committee
ALT
Alanine aminotransferase
AST
Aspartate aminotransferase
INR International Normalized Ratio
PT
Prothrombin Time

Declarations

Ethical approval and consent to participate

Ethical approval was obtained from the IRC of Kanti Children's Hospital (Reference number 1219; date 3rd march 2025) prior to study initiation. Written informed consent was obtained from parents or legal guardians of all participants. All methods performed in the study were in accordance with the relevant guidelines and regulations. The study involved no additional interventions beyond routine clinical care. Confidentiality of patient information was strictly maintained by assigning unique identification numbers and storing data in secure, password-protected systems accessible only to the research team.

Consent for publication

Written informed consent was received from patient/guardian for publication.

Competing interests

The authors declare that they have no competing interests.

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None.

Author Contribution

SKS and RHC conceptualized and designed the study, collected data, analyzed data, drafted the initial manuscript. SA and SR analyzed and critically reviewed the manuscript. RKN analyzed, revised and reviewed the manuscript. NKC analyzed, redesigned and reviewed the manuscript. All authors read and approved the final manuscript as submitted.

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Data Availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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Figures

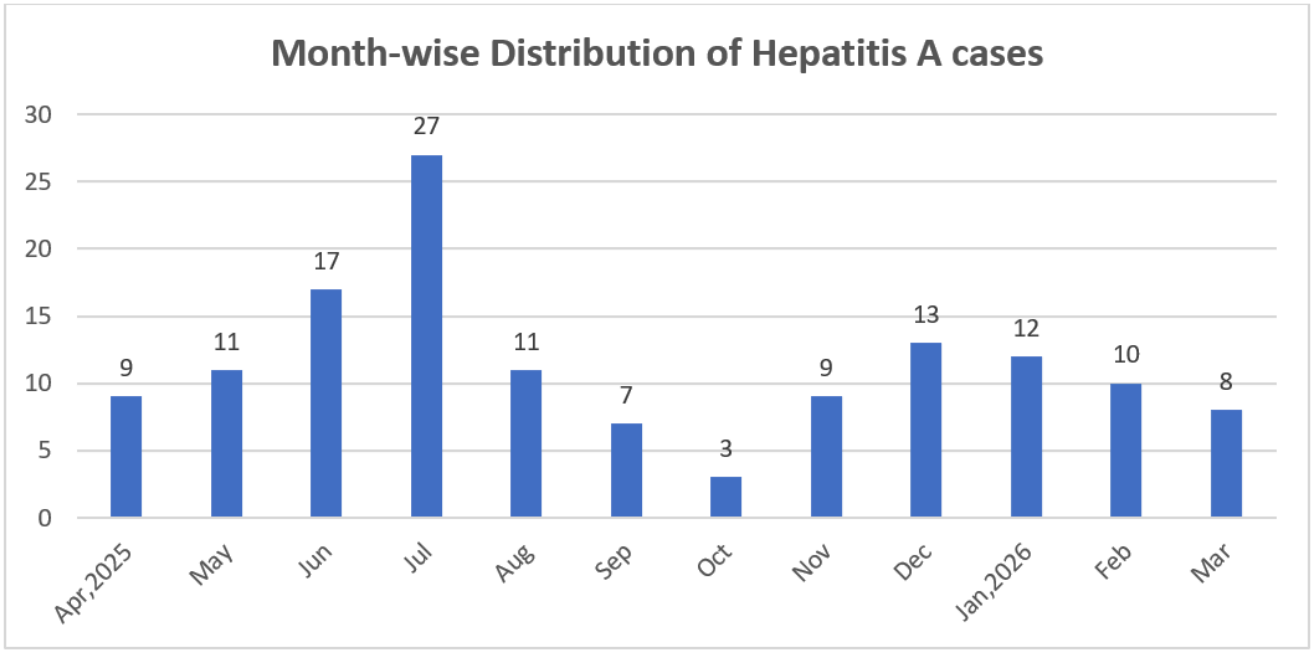


Figure 1

Month-wise Distribution of Cases

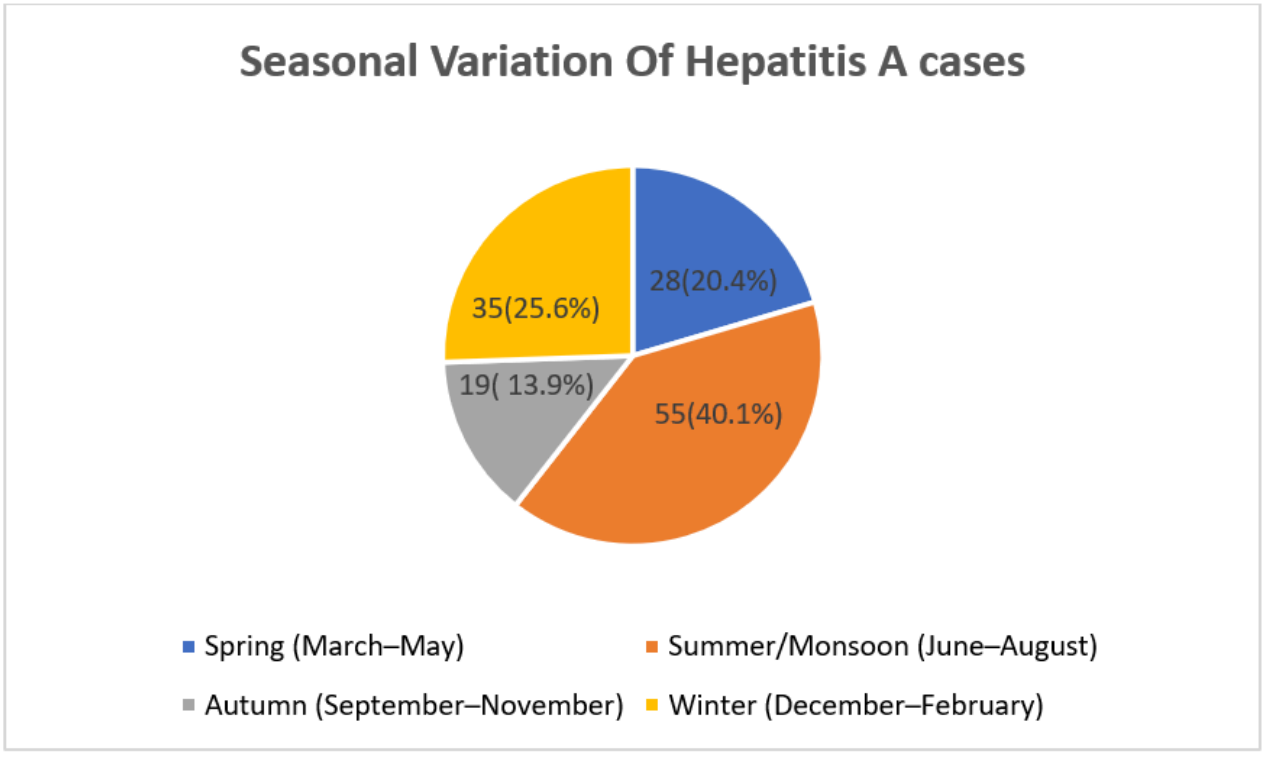


Figure 2

Seasonal Distribution of Cases